PROJECT CHARGE: 1706

PROJECT TITLE: TOBACCO PHYSICS

PROJECT LEADER: D. B. Losee

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HEAT TRANSFER STUDIES (Tiller, Losee)

Temperature/time distribution studies on all oriental cigarettes (R. Greene) with two different wrappers and two different weights have revealed different linear burn rates in contact with a substrate as well as different peak temperatures. The sample with the lowest temperature (406°C) recorded in the substrate also had the lowest contact linear burn rate (2.1 mm/min). The free smolder linear burn rate for this sample was 2.6 mm/min. Two of these cigarettes had the same citrate wrapper, but differed in weight (833 mg versus 915 mg). These versions had the same contact-linear burn rate, free smolder mass burn rate, free smolder-linear burn rate, but slightly different maximum contact temperatures (443°C for the 833 mg model versus 454°C for the 915 mg model).

Studies relating free smolder mass burn rates to heats of vaporization and void fraction are continuing. The mass burn rate - as determined gravimetrically - of a bone dry control (~ 2% moisture) is the same within experimental error as the mass burn rate of the equilibrated control (~ 12% moisture). The free smoldering heat flux for the bone dry control is significantly higher (~ 30%) than the equilibrated control.

Linear compression at constant cross sectional area of various circumference cigarettes is being used to explore the effect of void fraction on mass burn rate, heat flux and free smolder temperature. Cigarettes treated with 5, 10, and 15% glycerin have been made for a study of the effects of heat of vaporization on free smolder mass burn rate, heat flux and temperature. Cigarettes are currently being tested for OV, circumference, static burn time and glycerin levels.

NICOTINE EVOLUTION STUDIES (Kang, Waymack)

The EG/MS technique is being used to examine tobaccos with low naturally occurring alkaloid levels. These samples, provided by R. Kinser, are being compared with the same tobaccos which have had nicotine citrate added at the 2% alkaloid level. The temperature profile for mass 84, a nicotine mass fragment, is being followed in these experiments to determine any temperature evolution differences between endogenous nicotine and a nicotine salt added to a tobacco substrate.

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THERMAL ANALYSIS STUDIES (Tiller, Waymack)

A residue from laser perforating Eve tipping paper is composed of ink and lip release compound. Both materials contain plasticizers and cellulose nitrate.

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